

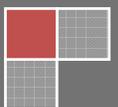
2010

ISI-Entrance Solutions

Economics

This document contains solutions of 2006-2009 sample exam problems (ME-I) for admission to MSQE program of the Indian Statistical Institute.

Disclaimer: The solutions offered in the document can be incorrect, the likelihood of which is very small though, so use at your own risk.



Prepared by: Amit Kumar Goyal

ISI: Year 2009

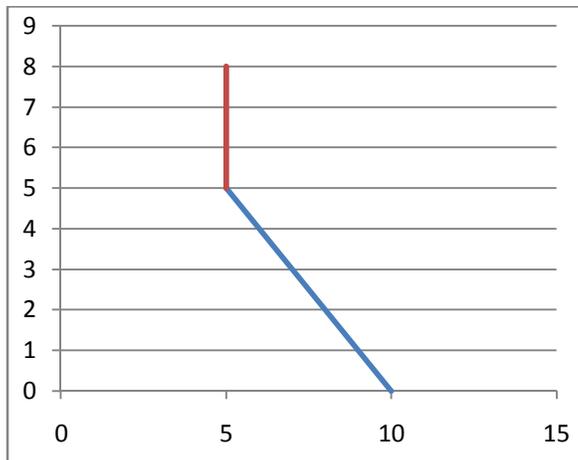
ME-I

1. (b) $\frac{3}{4}$
2. (d) $(\frac{1}{2})^{1/3}$
3. (b) $(f^2(x) - f(x)) / (2f(x) - 1)$
4. (a) $1/6$
5. (d) $Y = X - 1$
6. (c) $\log((1+e)/2)$
7. (c) $2/9$
8. (c) -1
9. (c) is continuous but not differentiable
10. (c) 21
11. (b) 32
12. (b) $7/16$
13. (c) ≥ 3
14. (b) $1/3$
15. (d) 5
16. (b) $n > \mu$
17. (b) $f(z) = az$ for some real number a
18. (a) 0
19. (c) $|f'(x) g'(x) h'(x); l m n; a b c|$
20. (a) 0
21. (c) c
22. (a) $(m+1)^{n-1}$
23. (b) $A = 3/4, B = -1/4$
24. (d) 9
25. (b) $2/3$
26. (a) $(1, 0)$

27. (b) 1
 28. (b) 9
 29. (a) it decreases on the interval $[2-3^{-1/2}, 2+3^{-1/2}]$
 30. (d) 18

ME-II (Only selected problems)

1. (i) less than 1
 (ii) $Y^* = (c_0 - t_0 c_1 + I + G) / (1 - c_1(1 - t_1))$
 (iii) multiplier = $1 / (1 - c_1(1 - t_1))$
 2. (i) $c_0 = \omega / (1 + \delta)$; $c_1 = (\omega(1+r)\delta) / (1 + \delta)$;
 (ii) As r increases c_0 stays the same and c_1 increases.
 (iii) $(1+r)\delta = 1$
 3. (i)



(ii) Show that: $\min(2\alpha x_1, \alpha x_1 + \alpha x_2) = \alpha \min(2x_1, x_1 + x_2)$ for $\alpha > 0$ (It's easy)

(iii) $C = Q$

4. (i) Entire Edgeworth Box
 (ii) 45° line from top left to bottom right in an edgeworth box with price ratio equal to 1.
 (iii) Yes, perfectly competitive outcomes are pareto optimal. No, it does not hold generally in all economies.
 5. (i) $p = (20 + a)/4$; $q_1 = (20 - a)/4$; $q_2 = (3a - 20)/4$
 (ii) $p_1 = 7.5$; $q_1 = 2.5$; $p_2 = (a + 5)/2$; $q_2 = (a - 5)/2$
 (iii) Just compare the profits

$$(iv) CS(i) = \frac{1}{2}\left\{\left(\frac{20-a}{4}\right)^2 + \left(\frac{3a-20}{4}\right)^2\right\}$$

$$CS(ii) = \frac{1}{2}\{6.25 + ((a-5)/2)^2\}$$

6. (i) $q_1 = (120 - q_2 - q_3)/2$

(ii) $q_1 = q_2 = q_3 = 30$

(iii) Case: Firm 2 and 3 merge

$q_1 = q_2 + q_3 = 40$, Firm 1 is better off and 2 & 3 are worse off.

Case: All three firms merge

All three firms are better off.

7. Do yourself

8. (i) $(1+a)y_j - T \geq 2y_j$ for $j \in \{H, L\}$

(ii) High ability person go to college for $T \leq 100$

Low ability person go to college for $T \leq 80$.

(iii) Both high ability and low ability person will attain education.

(iv) Assuming tuition paid by H-type is 100 and L-type is 80. Total subsidy is $(100-60) \times 5 + (80-60) \times 5 = 300$

x solves the equation where total tax receipts equal subsidy.

$$5(x/100)(150+110) = 300$$

$$x = 23.08\%$$

9. Do yourself

10. (i) Lowest marks for which it should admit the first applicant = 50

(ii) Lowest marks for which it should admit the first applicant = 62.5

Lowest marks for which it should admit the second applicant = 50

Prepared by: Amit Kumar Goyal

ISI: Year 2008

ME-I

1. (d) $\log|1+\log x| + \text{constant}$
2. (b) x^2+1
3. (c) $[0,1) \cup (1,\infty)$
4. (b) $x=0, y=3$
5. (c) a composite, one-to-one and onto function
6. (c) $x^y=y^x$
7. (b) 180
8. (d) none of these
9. (d) none of these
10. (c) differentiable everywhere
11. (c) $2/3$
12. (b) X's method is correct, but Y's and Z's methods are wrong.
13. (b) 15
14. (c) $(-5, 6)$
15. (b) a unique minimum but no maximum
16. (c) $K(n)$ is always divisible by 6
17. (a) $2/25$
18. (b) $8/5$
19. (a) equal but have opposite signs
20. (d) greater than or equal to 4
21. (d) no such x exists
22. (c) a root between 0 and 1
23. (a) $k^3/2$
24. (a) $(n+1)^{p-1} < r < (n+1)^{p+1}$
25. (b) $\sigma' < \sigma$
26. (a) increasing in x

- 27. (c) P is bistochastic with elements 0 and 1.
- 28. (d) decreasing in n
- 29. (d) The limit does not exist
- 30. (c) $(x_1^*=10, x_2^*=11)$

ECONOMICSENTRANCE.WEEBLY.COM

Prepared by: Amit Kumar Goyal

ISI: Year 2007

ME-I

1. (a) α/β
2. (b) not prime
3. (a) $k=\log 2$
4. (d) none of these
5. (d) none of these
6. (c) $x=4$
7. (b) $1/(2f(x)-1)$
8. (a) PQ
9. (c) $(1/2)\log|x^2+2x|+\text{constant}$
10. (d) $(-\infty, 1) \cup (2, \infty)$
11. (b) f_2 is one-to-one and onto, but not f_1
12. (b) $(2\log(a/b)+(b^2-a^2)/ab)(a/b)^{a+b}$
13. (d) infinitely many solutions
14. (a) $f(x;\theta)$ is a p.d.f. for all values of θ
15. (c) $-0.5 < r < 0$
16. (a) f_1 is not homothetic but f_2 is
17. (b) x
18. (d) continuously differentiable to $x=0$
19. (a) $\log|(x(x-2))/(x-1)^2| + \text{constant}$
20. (b) $1-14X(4/5)^{52}$
21. (b) $(5-2\sqrt{2})/2$
22. (d) divisible by 120 but not always divisible by 720.
23. (c) $p_1=p_2$ or $p_2=(3/4)p_1$
24. (c) In the (x,y) scatter diagram, all points lie on the curve $y=a+bx^2$, $a>0$, $b>0$.
25. (b) 168

26. (d) $f(1)$

27. (c) $\mu = n/2$ and $\sigma^2 = n/4$

28. (d) Statements (a), (b) and (c) are all incorrect.

29. (d) $|f(x)|$ is a decreasing function

30. (a) 81

ECONOMICSENTRANCE.WEEBLY.COM

Prepared by: Amit Kumar Goyal

ISI: Year 2006

ME-I

1. (a) $2f(x)$
2. (a) 0
3. (d) ${}^m C_i {}^n C_{k-i}$
4. (c) three
5. (d) RMS > AM when numbers are not all equal.
6. (a) $\sum (-1)^j {}^k C_j f(x+j)$
7. (c) $n!_{n-1}$
8. (d) $(cx^2+bx+a) \mid 1 \ b \ c; \ x^2 \ c \ a; \ x \ a \ b \mid$
9. (b) 1 is never divisible by 4
10. (d) $98/153$
11. (c) $1/p + 1/q$
12. (c) always a positive number
13. (a) 36
14. (a) 4
15. (d) the function f must always have the property that $f(0) \in \{0, 1\}$, $f(1) \in \{0, 1\}$, and $f(0)+f(1)=1$