1. At the end of the semester, half the final exam grade will replace the lowest test grade.
   (a) True for all students.
   (b) True, but only for some students.
   (c) False.
   (d) None of the above.

2. $e^{4 \ln x} =$
   (a) $4x$
   (b) $\ln(x^4)$
   (c) x^4
   (d) 4^x
   (e) None of the above.

3. $\ln\left(e^{\sin x}\right) =$
   (a) $\sin x$
   (b) $\ln(\sin x)$
   (c) $\cos x$
   (d) $\tan x$
   (e) None of the above.

4. $\int 6x \cos\, x^2\, dx =$
   (a) $-3 \sin\, x^2 + C$
   (b) $6 \sin\, x^2 + C$
   (c) $3 \sin\, x^2 + C$
   (d) $-12 \sin\, x^2 + C$
   (e) None of the above.

5. $\int e^{x^2}\, dx =$
   (a) $\dfrac{e^{x^2}}{2x} + C$
   (b) $e^{x^2} + C$
   (c) $2xe^{x^2} + C$
   (d) $e^{x^2} - 2xe^{x^2} + C$
   (e) None of the above.

6. $\int_2^e \dfrac{1}{x \ln x}\, dx =$

   (a) $2 \ln 2$
   (b) $\ln(\ln 2)$
   (c) $\ln(\ln 2) + \ln e$
   (d) $-\ln(\ln 2)$
   (e) None of the above.

7. $\int_{-1}^0 \dfrac{dx}{\sqrt{4 - x^2}} =$

   (a) $-\pi/6$
   (b) $\pi/3$
   (c) $-\pi/2$
   (d) $\pi/6$
   (e) None of the above.

8. The order of the differential equation $\dfrac{d^2y}{dx^2} + 4x\dfrac{dy}{dx} = \dfrac{d^3(\cos 2x)}{dx^3}$ is:

   (a) 1 (b) 2 (c) 3 (d) 4 (e) None of the above

9. The value(s) of r such that $y = e^{rx}$ is a solution of

$$y'' + 2y' - 8y = 0$$

   is (are):

   (a) $r = -4,\ r = 2$
   (b) $r = -2$
   (c) $r = -4$
   (d) $r = -2,\ r = 4$
   (e) None of the above.

10. The value(s) of r such that $y = e^{rx}$ is a solution of

$$y'' + 6y' + 9y = 0$$

    is (are):

    (a) $r = 3$
    (b) $r = -3,\ r = 3$

(c) $r = 0,\ r = 3$

(d) $r = -3$

(e) None of the above.

11. The value(s) of r such that $y = x^r$ is a solution of

$$y'' - \frac{3}{x}y' - \frac{12}{x^2}y = 0$$

is (are):

(a) $r = 6$

(b) $r = 2,\ r = -6$

(c) $r = -2,\ r = 6$

(d) $r = -3,\ r = 4$

(e) None of the above.

12. The value(s) of r such that $y = x^r$ is a solution of

$$x^2y'' - 7xy' + 16y = 0$$

is (are):

(a) $r = 4$

(b) $r = -4,\ r = 4$

(c) $r = 0,\ r = 4$

(d) $r = -4$

(e) None of the above.

13. Which of the following differential equations has $y = e^{3x}$ as a solution?

(a) $y'' - 5y' + 6y = 0$

(b) $y'' - y' - 12y = 0$

(c) $y'' + 2y' - 15y = 0$

(d) (a) and (c)

(e) (a), (b) and (c)

14. Which of the following differential equations has $y = x^{-2}$ as a solution?

(a) $y'' + \frac{2}{x}\,y' - \frac{6}{x^2}\,y = 0$

(b) $y'' + \frac{5}{x}\,y' + \frac{4}{x^2}\,y = 0$

(c) $y'' - \frac{1}{x}\,y' - \frac{8}{x^2}\,y = 0$

(d) (a), (b), (c)

(e) (b) and (c)