Solutions 1–8

all 10 pts except #2

Form A	Form B
1 D	1 E
2 C	2 A
3 D	~~3 C~~
4 ~~A~~B	4 ~~A~~B
5 C	5 D
6 D	6 ~~D~~E
7 A	7 C
8 C	8 D

Problem 9 (10 pts) Let $\mathbf{r}(t) = (x(t), y(t))$, $t \geq 0$ denote the position of a particle at time t with acceleration $\mathbf{a}(t) = (3t, -2)$, initial velocity $\mathbf{v}_0 = (2, 1)$ and initial position $\mathbf{r}_0 = (0, 6)$. The value of $x(t)$ when $y(t) = 0$ is

y data $v_y = -2t + 1$

$r_y = -t^2 + t + 6 = -(t-3)(t+2)$

Smallest positive root is $\boxed{t = 3}$ 4 pts for this

x data $v_x = \frac{3}{2}t^2 + 2$

$r_x = \frac{1}{2}t^3 + 2t$ 4 pts for this

when $t = 3$ this is $\frac{27}{2} + 6 = \frac{39}{2}$

Some credit if $t = -2$ was chosen.

2 for correct ans.

$x(t) = \boxed{\frac{27}{2} + 6 \text{ or } \frac{39}{2}}$

Problem 10 Find an equation of the tangent plane to the surface $z = 5 - 2x^2 - y^2$ at $(1, 1, 2)$, and the parametric equation of the line perpendicular to this plane at that point.

Plane

$f_x = -4x$, $f_x = -4$
$f_y = -2y$, $f_y = -2$ } @ $(1, 1, 2)$

4 pts for both partials

2 more for correct equation

(6 pts) Equation of the Tangent Plane: $\boxed{z - 2 = -4(x-1) - 2(y-1)}$

$z = -4x - 2y + 8$

$$\frac{x-1}{-4} = \frac{y-1}{-2} = \frac{z-2}{-1}$$

(6 pts) Equation of Perpendicular Line:

$x = -4t + 1$
$y = -2t + 1$
$z = -t + 2$

allow 4 points if x and y both right (they may have wrong sign on z)