11. In parts (b) and (c), we use Eq. 4-10 and Eq. 4-16. For part (d), we find the direction of the velocity computed in part (b), since that represents the asked-for tangent line.

    (a) Plugging into the given expression, we obtain

    $$\vec{r}\,\Big|_{t=2} = (2(8) - 5(2))\,\hat{\mathrm{i}} + (6 - 7(16))\,\hat{\mathrm{j}} = 6.00\,\hat{\mathrm{i}} - 106\,\hat{\mathrm{j}}$$

    in meters.

    (b) Taking the derivative of the given expression produces

    $$\vec{v}(t) = \left(6.00t^2 - 5.00\right)\,\hat{\mathrm{i}} + 28.0t^3\,\hat{\mathrm{j}}$$

    where we have written $v(t)$ to emphasize its dependence on time. This becomes, at $t = 2.00$ s, $\vec{v} = 19.0\,\hat{\mathrm{i}} - 224\,\hat{\mathrm{j}}$ m/s.

    (c) Differentiating the $\vec{v}(t)$ found above, with respect to t produces $12.0t\,\hat{\mathrm{i}} - 84.0t^2\,\hat{\mathrm{j}}$, which yields $\vec{a} = 24.0\,\hat{\mathrm{i}} - 336\,\hat{\mathrm{j}}$ m/s^2 at $t = 2.00$ s.

    (d) The angle of $\vec{v}$, measured from $+x$, is either

    $$\tan^{-1}\left(\frac{-224}{19.0}\right) = -85.2^\circ \quad \text{or} \quad 94.8^\circ$$

    where we settle on the first choice (-85.2°, which is equivalent to 275°) since the signs of its components imply that it is in the fourth quadrant.